ALDOT

Bridge Plans Detailing Manual

(ATRIP Program – Consultant Prepared Plans)

2/25/2013

PURPOSE OF THIS MANUAL

The purpose of this manual is to provide guidance and promote consistency to counties, cities and consultants in developing bridge contract drawings for the *Alabama Department of Transportation ATRIP Program*. Structural plans must clearly communicate the design concept and construction requirements for each project. Exceptions to methods used in detailing and presentation of plans are anticipated based on specific design requirements.

Detailers shall follow the guidelines in this manual unless the State Bridge Engineer or Bridge Design Section Supervisor overseeing a project gives exception approval. It is the detailer's responsibility to prepare complete plans in accordance with these guidelines. Competent personnel other than those performing the initial detailing shall make an independent check of the bridge plans for completeness and accuracy. A copy of the "checklist" portion of this document shall be completed and submitted with each set of bridge plans that are to be reviewed by ALDOT Bridge Bureau staff. This requirement applies to all structures designed using either prestressed girder and /or steel girders.

For details not specifically addressed in this document (such as navigational lighting and gauge details, structural seal footing details, structural cage details for footings and columns, access ladder and inspection platform details, catwalk details, rocker bearing details, etc.), detailers are encouraged to ask for example drawings of the most current details used by this Department.

Sample drawings to accompany this manual for developing a typical set of bridge plans are available upon request.

The ALDOT Bridge Bureau looks forward to working with the various Counties and Municipalities in making the Alabama Transportation Rehabilitation and Improvement Program a success.

Sincerely,

John F. Black, PE
ALDOT Bridge Engineer

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GENERAL GUIDELINES

TEXT

Typical text on all sheets shall measure 1/8'' in height on a full size bridge sheet. Detail titles, section labels, etc. shall measure 3/16'' in height on a full size bridge sheet. (1.5 times typical text height for CADD purposes). Text shall be all capital letters except when referencing Standard Specifications. Line spacing in paragraphs shall equal text height. Text height can be calculated by multiplying sheet scale by 0.125 or matching text height to "bridge sheet no." in the title box. Text shall be a weight of 1 for typical text and a weight of 3 for detail titles, section labels, etc. The underline line for detail titles, section labels, etc. shall also be a weight of 3.

LINE WEIGHTS

The following line weights shall be used:

Object lines – 3
Dimension lines – 1
Hidden lines – 0
Extension lines – 1
Terminator – 1
Phantom lines - 2

DIMENSIONING

Spacing between dimension lines with a single line of text shall be 3.5 times text height. Spacing for a double line of text shall be 5 times text height. Extension line shall extend 2/3 text height past the final dimension line. Auto dimensioning is not to be used.

SHEET BORDER

Verify title block information. The Bridge Inventory Number (BIN) will be shown on all sheets.

GENERAL SHEET GUIDELINES

1) Use an appropriate scale to "fill up" the sheet. Details drawn to an excessively small or large scale is not acceptable.

2) For structures detailed on more than one sheet – Place the elevation, plan view, notes, and quantities on the first sheet. Place the end view and other details on the second sheet.

3) Place quantities, elevation tables, and any other additional information either to the right side of the sheet or at the bottom of the sheet.

4) Place notes to the right side of the sheet or at the bottom of the sheet. Use notes in the sequence shown on the Example Plans. Do not scatter notes around the sheet.

5) Quantity boxes, when required, will show pay items listed according to pay item numerical order.

6) All text should either read left to right or bottom to top.

7) Circles with a number will be used to designate girder centerlines and abutments and bents on the General Plan and Elevation. Diamonds with numbers will be used to designate pile, column, and footing centerlines.

ORDER OF BRIDGE SHEETS

- Index, Quantities, and Required Sheet
- General Plan and Elevation Sheet
- Joint Layout
- Foundation Layout (when required)
- Superelevation Transition Sketch (when required)
- Span No. 1 Plan View
- Span No. 1 Bar Mat Details (when required)
- Span No. 1 Typical Section
- Span No. 1 Webwall Details (when required)
- Span No. 1 Girder Details

Repeat the above five items for additional spans of different lengths.

- Incremental Deck Elevations At Finish Grade
- Abutment No. 1 Details (two sheets when required)
- Abutment No. "n" Details (two sheets when required)
- Miscellaneous Abutment Details (for both abutments when required)
- Bent No. 2 Details (two sheets when required)
- Remaining Bent Nos. "n" Details (two sheets when required)
- Miscellaneous Bent Details (for all bents when required)
- Test Boring Record Sheets
- Bridge Special Project Drawings
- Original Bridge Drawings of Existing Bridge to Be Removed – "E" Sheets E1 to E"n" if available.

Note: Some sheet sequences can be combined on bridge plans with less complicated details (i.e. Index, Quantities, and Required Sheet and General Plan and Elevation Sheet, span plan and span typical section sheets, etc.)

REBAR DESIGNATIONS

SUBSTRUCTURE

ABUTMENT	LOCATION	
Bars **A**	Backwall/wings	(horizontal)
Bars **A1**	Wing	(horizontal)
Bars **B**	Backwall	(vertical)
Bars **C**	Cap	(top/horizontal/hooked)
Bars **D**	Backwall	(top/horizontal)
Bars **DS**	Drilled Shaft	(vertical)
Bars **F**	Cap	(cap face/horizontal)
Bars **HS**	Drilled Shaft	(horizontal/hoops)
Bars **J**	Footing and Cap	(vertical/hooked)
Bars **S**	Cap	(vertical/hooked/stirrups)
Bars **U(x)**	Pedestals	(vertical and horizontal)
Bars **V**	Cap/No Drilled Shaft	(horizontal/top and bottom)
Bars **VT**	Cap/Drilled Shaft	(horizontal/top/hooked)
Bars **VB**	Cap/Drilled Shaft	(horizontal/bottom/no hook)
Bars **X**	Footing	(long horizontal)
Bars **Y**	Footing	(short horizontal/hooked)
Bars **Z**	Pedestal	(horizontal/hoops)

BENT	LOCATION	
Bars **A**	Cap	(top/horizontal/hooked)
Bars **B**	Cap	(bottom/horizontal)
Bars **C**	Cap	(top/horizontal/hooked)
Bars **DS**	Drilled Shaft	(vertical/main)
Bars **E**	Cap Riser	(top horizontal)
Bars **F**	Cap	(cap face/horizontal)
Bars **G**	Cap riser	(vertical/hooked/stirrups)
Bars **H(x)**	Column	(horizontal/hoops)
Bars **HS**	Drilled Shaft	(hoops)
Bars HT	Column	(horiz., transverse, L shape, hooked)
Bars **J**	Column/Footing	(vertical/hooked)
Bars L	Cap	(horiz., transverse, L shape, hooked)
Bars **M(x)**	Column	(vertical/main)
Bars **N**	Column/Drilled Shaft	(dowel splice)

Bars **P**	Footing	(horizontal/longitudinal/hooked)
Bars **R**	Footing	(horizontal/transverse/hooked)
Bars **S**	Cap	(vertical/hooked/stirrups)
Bars **T**	Footing	(horizontal/hoops)
Bars **U(x)**	Pedestals	(vertical and horizontal)
Bars **V**	Strut	(vertical/stirrup/no hook)
Bars **W**	Footing	(vertical/corner)
Bars **X**	Strut	(horizontal/main bars)
Bars **Y**	Strut	(horizontal/face bars)
Bars **Z**	Pedestal	(horizontal/hoops)

SUPERSTRUCTURE

SPAN	**LOCATION**	
Bars **A**	Deck	(top, transverse)
Bars **C**	Deck	(bottom/transverse)
Bar A1/**C1** spanskewed	Deck	(1st top/bot. mat cutoff bar for greater than 20 degrees)
Bar A(n)/**C(n)**	Deck	(last top/bottom mat cutoff bar)(min. o. to o. length = 1'-6'')

Note: When splicing is not required for transverse deck reinforcement, both top and bottom mat of reinforcement maybe designated as Bars C. See page 9 for guidance when splicing is required for transverse deck reinforcement.

Bars **D**	Deck	(longitudinal/top and bottom)
Bars **DD**	Deck	(longitudinal over continuous span bents)
Bars **E**	Deck	(longitudinal/bottom between girders)
Bars **MM**	Deck	(top & bottom corner bars for skewed span, see Std. Dwg. I-131)
Bars **P**	Deck/webwall	(haunch/end beam bar near bridge joint armor plate)
Bars **R**	Webwall	(horizontal through girder bars)
Bars **R1**	Webwall	(horizontal/threaded bar)
Bars **S(x)**	Webwall	(vertical/stirrups)
Bars **W(x)**	Webwall	(horizontal)

For the above, **(x)** represents a unique bar number. For example, if a column and drilled shaft are detailed on the same drawing and the diameter of the column and drilled shaft are different, the column hoops might be assigned a designation of **H1**. The drilled shaft hoops would therefore need to be assigned a separate designation of **H(x)**, for this example, **H2**.

REINFORCEMENT – BAR LENGTHS

The following lengths are recommended as maximum lengths for reinforcing bars without providing a splice:

English Bar Size	Maximum Length
3	40 feet
4	60 feet
5	60 feet
6	60 feet
7	60 feet
8	60 feet
9	60 feet
10	60 feet
11	60 feet

GENERAL: The following guidelines should be followed for splicing reinforcement. Special circumstances may require deviation from this policy. In this case, splicing requirements should be determined by the designer and approved by the Bridge Engineer.

SUPERSTRUCTURE:

Transverse deck reinforcement: When bar length exceeds 40 feet but is less than 60 feet in length, include a note stating "At the Contractor's option, Bars C (or Bars A and C if they're called out this way) may be spliced 24 Dia. (Min.) on the top bars at mid-point between girders and on the bottom bars over girders. Additionally, add a note near the quantity box stating "Optional splice not included in estimated quantities shown". Exception to this policy may be granted with approval of the Bridge Engineer. Bar lengths exceeding 60 feet will require splicing at designated locations and shall be included in the quantities.

Longitudinal deck reinforcement (Bars D & E): When bar length exceeds 40 feet, add a note stating "Splice Bars (Type) D & E 24 Dia. (Min.)" and include the appropriate number of splices per line of bars in the quantities.

Long reinforcement for endwalls (Bars (Type) W(x)): Should be handled similarly to longitudinal deck reinforcement.

SUBSTRUCTURE:

Abutments: Horizontal backwall (Bars (Type) A), paving seat (Bars PS1), cap temperature (Bars (Type) F) when length exceeds 40 feet include a note stating "Splice Bars (Type) A, F and PS1 35 Dia. (Min.)" and include the appropriate number of splices in the quantities. When the abutment cap is supported by piles under each girder, main cap reinf. (Bars (Type) V) when length exceeds 40 feet, include in the previous note to splice 35 Dia. (Min.). When the abutment cap is supported by columns, main cap reinforcement (Bars (Type) VT & VB) when length exceeds 60 feet end to end of bar, shall be spliced at locations and splice lengths designated by the designer, include splice(s) in quantities.

Bent and Pier Caps: Similar to abutments.

Columns: When column height exceeds 30 feet, include a note stating "At the Contractor's option, Bars Type M may be spliced as shown." Include a detail of the splice on the plans. Use a 35 Dia. staggered splice pattern unless directed otherwise by the design.

Drilled Shafts: When vertical drilled shaft reinforcement exceeds 60 feet in length, provide a tension lap splice to be located in the lower part of the shaft.

REINFORCEMENT – OTHER

In accordance with Section 835 of the Standard Specifications, the fabricator can furnish either Grade 40 or Grade 60 reinforcement unless otherwise stipulated in the Specifications or so noted on the Bridge Drawings. For example, Article 510.02 specifies that all steel reinforcement used in CIP bridge decks shall be AASHTO M31 Grade 60 unless otherwise noted. Similarly, Article 506.02(e) specifies that all steel reinforcement for drilled shafts shall be Grade 60. The designer should be aware of these specifications and insure that reinforcing design requirements are clearly noted on the bridge drawings if design requirements would dictate using higher strength steel than addressed by Standard Specifications.

> For example: If the design is based on the use of Grade 60 reinforcement in the substructure, a plan note will need to be provided to override Section 835 of the specifications.

Only Grade 40 or Grade 60 steel should be utilized on ALDOT bridge designs.

Reinforcement Presentation

All dimensions on reinforcement details will be rounded to a quarter inch.

All plan sheets presenting the drawings for a part of the bridge shall include a detail for each bent bar.

In no case, shall the same designation be used for reinforcement bars of different size, length and shape when employed in elements of the substructure, and the same shall be applicable to bars used in the superstructure design.

When detailing lengths of reinforcement bars, consideration must be given to transportation and handling and, where extremely long lengths are contemplated, to availability and special orders.

If it becomes necessary to provide varying length reinforcement bars to accommodate a tapering or flared condition on any part of a structure, do not detail the bars in a table of small increment changes in length; detail the bars in groups of the same length to accommodate the flare by variance of lap. All bars in the same group shall carry the same bar designation. This criterion is not to be construed as applicable to the ends of the deck slab of a skewed structure. On Steel girder spans, the bars shall be fabricated to the required out-to-out length with a hook and marked. This is not required on prestressed girder spans.

"INDEX, QUANTITIES AND REQUIRED" SHEET

1. ESTIMATED QUANTITIES

Quantity, unit, item number and description of each pay item. (Be certain each item of work or material required has method of payment) Quantity numbers should be right justified and unit descriptions should be left justified. The following is a partial list of commonly used pay items.

Quantity	Unit	Item Number	Description
	Lump Sum	206A	Removal of Old Bridge, Station __
	Cubic Yards	215A	Unclassified Bridge Excavation
	Lump Sum	215B	Cofferdams or Sheeting and Shoring, Station __
	Pounds	502A	Steel Reinforcement
	Lump Sum	502B	Steel Reinforcement For Bridge Superstructure, Station __, Approximately __ Pounds
	Cubic Yards	503A	Seal Concrete
	Lump Sum	503B	Cofferdam and Pumping, Pier/Bent No. ____
	Lump Sum	503C	Core Drilling Seal Concrete Footings
	Linear Feet	503D	Sonic Logging Seal Concrete Footings
	Each	505A	Steel Test Pile (HP_x_)
	Each	505A	Concrete Test Pile (_ " Square)
	Each	505B	Static Loading Test (Pile Type/Size)
			(See "Pay Item Comments")
	Each	505B	Dynamic Loading Test (Pile Type/Size)
			(See "Pay Item Comments")
	Each	505G	Pile Points (Type ___ , ___")
			(See "Pay Item Comments")
	Linear Feet	505H	Pilot Holes
	Linear Feet	505M	Steel Piling Furnished and Driven (HP _x_)
	Linear Feet	505N	Concrete Piling Furnished (_" Square)
	Linear Feet	505O	Concrete Piling Driven (_" Square)
	Linear Feet	506A	Drilled Shaft Excavation, _'-_" Diameter
	Linear Feet	506B	Special Drilled Shaft Excavation, _'-_ " Diameter
	Linear Feet	506C	Drilled Shaft Construction. _'-_" Diameter, Class DS_ Concrete
			(See "Pay Item Comments")

Linear Feet	506D	Exploration Below Drilled Shaft
Linear Feet	506F	Permanent Drilled Shaft Casing, _' -_" Diameter
Each	506G	Crosshole Sonic Logging, _' -_" Diameter
Each	507A	Wire Rope Abutment Anchor Assembly
Pounds	508A	Structural Steel
Each	508B	Structural Steel Superstructure, (Description), Approx. ____ lbs. (Specialty Item)
Lump Sum	508E	Furnishing, Fabrication & Installation of Ladders
Lump Sum	508F	Bridge Deck Drainage System
Cubic Yards	510A	Bridge Substructure Concrete, Class A
Lump Sum	510C	Bridge Concrete Superstructure, Sta. _____, Approx. _____ Cu. Yds.
Square Yards	510E	Grooving Concrete Bridge Deck
Each	511A	Elastomeric Bearings, Type__
Each	511A	Elastomeric Bearings, Type__ , Mark ___
Each	512A	Precast Concrete Abutment Caps, ____Wide by ____ Deep by ____ Long
Each	512B	Precast Concrete Intermediate Bent Caps, ____Wide by____ Deep by ____ Long
Each	512C	Precast Concrete Type _* Span Section, ____Wide by____ Deep by ____ Long
Each	512D	Precast Concrete Type _** Section
Each	512E	Precast Concrete Abutment Panels, Type ____
Each	512F	Precast Concrete Wing Panels, Type ____
Each	512G	Precast Concrete Abutment Wing Cap Panels, Type ____
Linear Feet	513B	Pretensioned-Prestressed Concrete Girders, Type__, (Specialty Item)
Lump Sum	519A	Navigation Lighting System
Lump Sum	520A	Repairs to Existing Bridge, Station ____
Lump Sum	520B	Raising Existing Bridge, Station ____
Lump Sum	521B	Coating Existing Bridge at ____
Linear Feet	634E	Industrial Fence, ____ Ft. High, Special Mounting

2. PAY ITEM COMMENTS

a. Avoid contingency pay items whenever possible. Contingency pay items are those that, in the opinion of the designer, merit inclusion in the estimated quantities because of unknowns relative to the project.

A couple of examples of contingency pay items are:

1. Seal concrete: if the designer has question as to whether or not seal will be required to de-water a cofferdam.
2. Pilot holes: if the designer has question as to whether or not pilot holes will be necessary to obtain specified minimum tip elevations.

Whenever a contingency pay item is deemed necessary, insure that contingency item is flagged and referenced with appropriate notes.

b. Do not include percentages in quantity calculations.

c. Refer to foundation report for recommended Class of drilled shaft concrete, DS1, DS2, or DS3, as applicable.

d. Refer to foundation report to see if test pile/static loading test required.

e. Refer to foundation report to see if a dynamic loading test is required. Typically, for projects other than County Route projects, a dynamic loading test will be required each time a static load test is required.

If a static loading test is required and a dynamic loading test has not been specified in foundation report, check with Materials and Tests Bureau to see if this was an intentional omission or if a pay item for a Dynamic Loading Test should be included in the Bridge Estimated Quantities. (This applies to Non-County Route projects only.) Indicate test location with symbol and note as per foundation report recommendation.

f. If cutting or biting teeth are needed on pile points due to inclined rock then flag pile point protector pay item and provide the following note:

"The contractor shall furnish Pile point protectors with integrally cast cutting teeth intended for use on steeply sloped rock."

3. REQUIRED

_____ Description of required superstructure separated in to span lengths.
_____ Description of required abutments with footing descriptions.
_____ Description of required bents with footing descriptions.
_____ Standard Bridge Details, Standard Drawing I-131.
_____ Standard Bridge Notes, Standard Drawing BGN-1.
_____ Test Boring Record Sheet reference.
_____ Plans of existing bridge to be removed (if applicable) Bridge Sheet E1 to E(n)
_____ Special Project Drawings as required. (i.e., prestressed concrete pile details PSCP-1, industrial fence details IFS-__, traffic protection details TP-1, steel bearings, I-100, etc.)

4. STANDARD BRIDGE NOTES

_____ Reference required notes to Standard Drawing BGN-1
_____ Under STANDARD BRIDGE NOTES, provide roadway width (gutter to gutter) and barrier rail type.
_____ List appropriate BGN-1 notes from current special project drawing.

5. INDEX TO BRIDGE SHEETS

_____ List bridge sheet numbers with sheet title.
_____ Sheet title should be as brief as possible and match the sheet title shown in the individual sheet title boxes. (Do not list details on the sheet in the sheet title). Sequence sheets with "Sheet 1 of x", "Sheet 2 of x", etc. in the sheet title.

6. OTHER

_____ Provide the following prosecution note for unauthorized use of plans (Locate this note above title block).

THESE DRAWINGS REPRESENT DESIGNS PREPARED FOR USE BY THE ALABAMA DEPARTMENT OF TRANSPORTATION AND ARE NOT TO BE COPIED, REPRODUCED, ALTERED, OR USED BY ANYONE, OR ANY ORGANIZATION, WITHOUT THE EXPRESSED WRITTEN CONSENT OF THE ALABAMA DEPARTMENT OF TRANSPORTATION REPRESENTATIVE AUTHORIZED TO APPROVE THIS USE. ANYONE MAKING UNAUTHORIZED USE OF THESE DRAWINGS MAY BE PROSECUTED TO THE FULLEST EXTENT OF THE LAW.

7. CONSULTANT CERTIFICATION

The first sheet of the bridge plans should be stamped by the engineer(s) of record and the following note should be included adjacent to the registered engineer(s) stamp:

I CERTIFY THAT COMPLETE REVIEWS OF THE DESIGNER'S CALCULATIONS, CONTRACT STRUCTURAL DRAWINGS, APPLICABLE SPECIFICATIONS, AND SPECIAL PROVISIONS HAVE BEEN MADE BY COMPETENT ENGINEERS OF THIS ORGANIZATION, AND THAT THESE PLANS ARE ACCURATE, COMPLETE, AND SUITABLE FOR LETTING.

APPROVED:_____ DATE:_____
(Engineer of Record's Signature)

REGISTRATION NO. _____

APPROVED:_____ DATE:_____
(Reviewing Engineer's Signature)

REGISTRATION NO. _____

"GENERAL PLAN AND ELEVATION" SHEET

1. PLAN

_____ Identify centerline survey and centerline bridge. Locate centerline bridge with respect to centerline survey. Locate Profile Grade Line on dual bridges.
_____ Name of road, tracks, creek, etc. that bridge crosses over
_____ Intersection angle, skew, intersecting stations
_____ Stationing at Abutments and Bents. Label begin and end bridge as "Back Of Abutment".
_____ Show working line of joint and/or centerline of bent designation
_____ Point of minimum vertical clearance over roadway or railroad
_____ Horizontal clearance provided (with respect to face of column) if applicable
_____ Bridge width gutter to gutter and overall deck width
_____ Limits of riprap protection (if stream crossing). Detail abutment riprap and note in accordance with Special Drawing RR-610 unless site justifies otherwise. Dimensioning of riprap apron will be addressed through Note No. 12 on Standard Dwg. BGN-1. Show riprap whenever scour protection required around piers. When abutments are not affected by Design Stage Flood show riprap on front slope only and dimension 2' outside limits of bridge deck. Skew should be considered when providing this detail. No apron or side slope riprap protection will be required.
_____ North arrow
_____ Barrier rail transition at beginning and end of bridge
_____ Bridge orientation at both ends. (i.e., ----> To Jasper)
_____ Nearest Mile Post (if proposed bridge is to be constructed over a railroad)
_____ Show in-place bridge to be removed with stations.
_____ Show barrier rail extension (for skews 15 deg. or greater) and reference Standard Dwg. I-131
_____ Show and label barrier rail joints and reference Standard Dwg. I-131
_____ Show and label deck drains (4 – 5 will suffice) and reference Standard Dwg. I-131

2. ELEVATION

_____ Span lengths and type of spans (simple or continuous, AASHTO, Bulb Tee, etc.
_____ Overall length of bridge.
_____ Alignment (tangent, or if curved, degree of curve and indicate if curve is to the left or to the right)
_____ Grade (in percentage), or if bridge will be in vertical curve, give reference to Vertical Curve Data (i.e. See V.C. sketch).
_____ Number abutments and bents.
_____ For grade separation structures, show aggregate protection w/filter blanket or slope paving (Roadway Item). Specify slope of 3:1 (3 horizontal to 1 vertical) Interstate, 2:1 State and Rural routes unless otherwise noted on the roadway drawings or foundation report. Bridges spanning railroads typically require 2:1 slopes.
_____ For stream crossings, provide loose riprap, 24 inches thick with filter blanket (Roadway Item) to protect abutment fills. Use 2:1 slope unless noted otherwise on the roadway drawings or in the foundation report.
_____ Riprap and filter blanket should be shown for stream crossings, set elevation for top of riprap on abutment roadway fill side slopes at 2 feet above design flood stage, but no higher than base of abutment cap.

_____ Provide riprap protection at bents (Roadway Item) when required. Typically riprap protection should be provided at all bent locations of a stream crossing when pile type foundations (pile bents or pile footings) are being used. Specify 2 feet thick with filter blanket and set limits a minimum of 5 feet outside substructure construction limits. (i.e., footing width/length plus 10 feet, or for pile bent, 5 feet each side of centerline of bent and 5 feet beyond centerline of outermost piles). If pile encasements are to be used where riprap protection is required, then verify that encasements extend a minimum of 3' below bottom of riprap. Insure that top of riprap is detailed flush with top of natural ground.

_____ Designate expansion and fixed end of span.

_____ Show groundline at centerline of bridge. Show groundlines at offsets left and right of centerline if required by varying site conditions. (This information should agree with the 3-line profile information used to prepare the bridge layout.)

_____ Bottom of footing elevation. Show as "approximate" for rock or spread type footing. Show actual elevation for pile footing.

_____ Bottom of drilled shaft elevations. Show as "approximate" as applicable.

_____ Show minimum and/or estimated pile tip elevations as applicable unless shown on foundation layout.

Stream Crossings:

Show minimum and estimated tip elevations for bent locations.

Show estimated tip elevations for abutment locations.

Grade Separations:

Show estimated tip elevations for bent and abutment locations.

_____ Show design flood stage elevation (i.e., 25 year flood for county projects unless otherwise directed. 50 year flood for state and federal projects. DO NOT show normal pool elevation. Show water surface elevation at time of foundation investigation.)

_____ For navigable waterways, show bridge reference elevation for navigational clearance, (BRENC) or other elevation used in establishing the navigational vertical clearance. Show horizontal and vertical clearance provided for navigation.

_____ If excavation is required around abutments to obtain required end slopes or if channel improvement is required, indicate the excavation limits and note as a roadway item.

_____ Show stationing and dimensioning of centerline of bents when this stationing will differ from the working line of joint stationing due to eccentric loading on bents.

_____ Show vertical clearance on grade separation structures.

3. HYDRAULIC DATA

_____ Drainage area, opening provided, (computed for skew if applicable).

_____ Q25, Q50, etc. with stage elevations as per hydraulic report.

_____ Total flood plain, main channel, relief (if applicable).

_____ Check freeboard to insure that a minimum of 2' is provided between the bottom of the lowest girder and the design stage elevation. (Design for 25 year flood on County Routes, 50 year design flood on other routes unless otherwise directed). If less than 2 feet provided and it appears that conditions may occur where all or portions of bridge may be submerged at some point in time, then make provisions for anchoring the superstructure to the substructure at each end of span. Provide vent (weep) holes when deemed necessary. If less than 2' of freeboard will be provided, then the project file should also have a letter stating that a design waiver is being allowed and this letter should state why the waiver is necessary.

4. SPECIAL NOTES

_____ If piles will be end bearing, provide a note stating that piles shall be driven to refusal. Note: If piles are not end bearing, then a pay item for test pile(s) and load test(s) (static, dynamic, or both) will need to be provided.

_____ If pile footing foundations are being specified for a stream crossing, provide note stating that bottom of footing elevations have been set based on predicted scour and are not be altered without the approval of the Bridge Engineer.

_____ If pile bents are being specified include the following note:
Furnishing of all necessary equipment and construction of all sheeting and shoring, cribs, cofferdams, caissons, de-watering, etc. which may be necessary for the construction of the pile encasements shall be a subsidiary obligation of pay item 510C, Bridge Substructure Concrete.

_____ On bridge replacement projects, show substructure conflict note if applicable.

5. VERTICAL CURVE SKETCH

_____ Show grades, PVI stations and elevations, and vertical curve length shown on the roadway drawings. Verify that this information has been shown correctly on the bridge drawings and that vertical curve data used in calculating bridge geometrics agrees with roadway vertical curve data.

6. HORIZONTAL CURVE DATA

_____ If bridge is to be constructed in horizontal curve, provide verified curve data.

"JOINT LAYOUT" SHEET

1. ELEVATION VIEW (ABUTMENT)

_____ Show cut section for superstructure at abutment(s) and indicate girder type, bearing type, overall superstructure depth (slab + girder + bearing) at centerline of bearing.
_____ Show abutment backwall thickness.
_____ Show dimension from back face of abutment backwall to centerline of bearing along centerline of girder.
_____ Show required joint opening at 70 degrees F.
_____ Show and label armor plates.
_____ Show paving seat if required.

2. ELEVATION VIEW (BENTS)

_____ Show cut section for superstructure at bent(s) and indicate girder type, bearing type, overall superstructure depth (slab + girder + bearing) at centerline of bearing.
_____ Show dimension from working line of joint to centerline of bearing along centerline of girder.

_____ Show required joint opening at 70 degrees F.
_____ Show and label armor plates.

"SUPERELEVATION TRANSITION" SHEET

A superelevation transition sketch should be provided whenever all or a portion of the bridge will be in transition. When a bridge will be in full superelevation for the entire length of the structure, this drawing is not required. When required, this sheet should provide the following information:

_____ Identify control line(s) used in developing transition sketch (i.e., centerline of bridge, baseline WBR, etc.)
_____ Show transition lines at edges of 6' parabolic and at gutterlines from a condition of full superelevation to a point of normal crown.
_____ Label left and right gutter, left and right side of 6' parabolic crown.
_____ Locate station representing normal crown condition, station representing reverse crown on low side, and station representing full superelevation condition (taking into account the vertical curves at breakpoints (PVI's) of transition lines).
_____ Show critical bridge sections with cross slopes.
_____ Show correction (in feet) to transition lines (parabolic crown lines and gutterlines).
_____ Verify that standard 50' vertical curves at adjacent PVI stations do not overlap. If vertical curves will overlap using standard 50' length, then address with plan note and dimension accordingly.
_____ Show bridge limits affected by SE transitioning.
_____ Show horizontal curve data.
_____ Show Superelevation Transition length and locate P.C. or P.T. as applicable.

"FOUNDATION LAYOUT" SHEET

A foundation layout sheet should always be provided whenever the bridge is to be constructed in stages, is skewed, and/or whenever the working line of joint stationing is different from the centerline of bent stationing. When a foundation layout sheet is required in the plans, scaled details of the following information should be provided:

_____ Numbering and stationing for each abutment and bent location.
_____ Dimensioning from beginning of bridge to centerline of bent, centerline of bent to centerline of bent, and centerline of bent to end of bridge.
_____ Offset dimensions from centerline of bridge to centerline of each footing/shaft/pile etc.
_____ Indicate footing dimensions, drilled shaft diameter, pile size/type, as applicable.
_____ Show skew of substructure unit relative to control line (i.e. centerline of bridge, survey, etc.)
_____ Show North arrow.

"SPAN DETAILS" SHEET
(For Prestressed Concrete Girders)

1. PLAN VIEW

_____ Overall span length joint to joint (if end span, show dimension from Beginning/End of bridge to the working line of joint of the next span).
_____ If skewed, show skew angle.
_____ On skewed bridges, show transverse dimensioning on left end of span and show skewed dimensioning on right end of span.
_____ If curved, show chord girder lengths "LG" in a table (begin or end bridge to joint, joint to joint) for each girder. Do not show angle from girder to working line.
_____ On curved bridges, show dimensions along both edges of slab and along centerline of bridge.
_____ Show joint reference (i.e. Begin, End of Bridge, working line of joint, centerline of bent no. 2, etc.) and begin or end span stations.
_____ Show required joint opening @ 70 degrees F.
_____ Note open joints in barrier rail and refer to Standard Dwg. I-131for details.
_____ Specify thickness of concrete webwalls. (spell out webwall, DO NOT use W.W.)
_____ Show deck drains (5 or 6 on one side) and note typical on both sides, if applicable, and reference Standard Dwg. I-131 for details.
_____ Provide note for deck drain spacing if different than Standard Dwg. I-131, and verify that the following is addressed:

1. Space deck drains at 5'- 0" o.c. for normal crown bridges and reduce to 4'- 0" o.c. for bridge widths greater than 44 feet.
2. If bridge is in full superelevation and gutter to gutter dimension is greater than 28 feet, reduce deck drain spacing to 4'-0" o.c.
3. If bridge is in full superelevation, omit deck drains on high side of span.
4. Omit drains in portion of span over roadway or tracks and in transition region of barrier rail.
5. If low point of vertical curve falls on the bridge, decrease deck drain spacing in this area. If necessary, consult Bridge Hydraulic Engineer for assistance in determining required deck drain spacing at low point of vertical curve.

_____ Identify Bridge Joint Armor Plates and reference Standard Dwg. I-131
_____ Locate girders, gutterline and outside edge of slab with respect to centerline of survey or profile grade. Show overall width of bridge and barrier rail width.
_____ Identify Centerline of Bridge and reference it to centerline of roadway, construction, survey, profile grade, or baseline as applicable. Dimension centerline to profile grade line if separate.
_____ Show numbering of girders left to right looking station ahead.
_____ Show Transverse Deck Reinforcement (4 or 5 bars) all the way across the bridge.
For skews greater than 20 degrees, use cutoff bars in skewed portion of deck and show bars perpendicular to centerline of bridge. Determine number of required cutoff bars by setting length of last cutoff bar at 18 inches. For skews 20 degrees and less, detail transverse deck reinforcement to be placed along skew. Reference the "Reinforcement – Bar Lengths" section of the manual for additional guidance on superstructure reinforcement.
_____ For 40' bridge width, no skew, show optional splices for top and bottom transverse deck reinforcing bars. (See superstructure reinforcement guideline of this manual

_____ Show finished deck elevations at beginning and end of bridge and working line of joint locations at gutter lines, girder lines, centerline of bridge, profile grade, as applicable.Show all elevations at required locations or in tabular form.

2. DECK CROSS-SECTIONAL VIEW

_____ Identify the section being represented by the view. (i.e., TYPICAL CROSS SECTION)
_____ Number girders left to right, show girder spacing and dimension overhang.
_____ If the span is in horizontal curvature and prestressed girders are required, add a note stating that spacing shown for the girders is along radial lines at the beginning and end of bridge and working line of joint locations only.
_____ Show typical deck thickness (between girders), deck reinforcement and reinforcing cover.
_____ Show deck thickness at outside edge of slab.
_____ Show deck drains if applicable.
_____ Show drip bead.
_____ Reference Standard Dwg. I-131for applicable details in this section.
_____ Provide splice note for longitudinal deck reinforcing Bars D and E if span is greater than 60 feet in length. (Note: Splice D and E Bars a minimum of 24 Diameters)
_____ When applicable, provide note stating that with prior approval of the Bridge Engineer, the contractor may alter the layout of Bars Type D and E to accommodate the use of standard bar lengths.
_____ Show gutterline to gutterline, gutterline to edge of slab, and out to out slab dimensions.
_____ Locate centerline of bridge or profile grade and show dimensioning to centerline of girders from this control line.
_____ Indicate girder type (i.e., AASHTO Type II, BT-72, etc.).
_____ Show deck slope and refer to Standard Dwg. I-131 for 6' parabolic crown details if applicable.
_____ Verify that the slopes shown on the Deck Cross-Sectional View agree with the slopes shown on the roadway typical section.
_____ Locate and show number and spacing of Bars E in bottom of slab.
_____ Locate and show number and spacing of Bars D in overhang.

3. ESTIMATED QUANTITIES

_____ Provide quantities for (502B) steel reinforcement, (508A) structural steel, and (510C) superstructure concrete.
_____ If details address more than one span, separate quantities for each span or add note to indicate that quantities shown are for one span only.

4. SPECIAL NOTES

_____ When span is in a curve, provide a note stating that girder dimensions shown are measured along chords from back of abutment to CL joint. (or CL joint to CL joint).

_____ When span is in a curve, provide a note stating that bars C#5 shall be placed on radial lines (skews greater than 20 degrees) with the spacing measured along the long side of the span.

"PRESTRESSED CONCRETE GIRDER DETAILS" SHEET

1. GIRDER ELEVATION

_____ Show overall girder length (along centerline of girder) and dimensioning from centerline of bearing to centerline of bearing and from centerline of bearing to end of girder. Show, label and dimension midpoint of girder. Half girder elevation are acceptable.
_____ Show stirrup spacing and verify that spacing + clearance = overall girder length.
_____ Show strands and verify that location of strands agrees with cut sections.
_____ Locate holddown point for strands if design requires draped strand pattern. Reference Standard Dwg. I-131 for holddown point details.
_____ Indicate strand size, number of strand, and whether strands are draped or straight.
_____ Locate threaded inserts and/or holes for diaphragm connections.
_____ Show confinement reinforcing Bars B at ends of girder and indicate spacing.
_____ Label elevation detail,(i.e. GIRDER ELEVATION (TYPE BT-72), etc. and note that dimensioning is along centerline of girder.
_____ For girders that will require Type 4 Bearings, provide a note to reference Standard Dwg. I-131for embedded sole plate details. (optional for Type 2 Bearings)

2. GIRDER CUT SECTIONS

_____ Show Typical Girder Section with dimensions.
_____ Show section at end of girder with strand pattern.
_____ Show section at end of girder with reinforcement.
_____ Show section at midpoint of girder with strand pattern.
_____ Show section at midpoint of girder with reinforcement.
_____ Show sheathed strands at end of girder if applicable and flag sheathing designation to a note indicating length of sheathing required.

3. NOTES

_____ Prestressing strands shall be 1/2" diameter 270 KSI * with an Initial Tension of * * K/Strand unless otherwise noted

*Stressed Relieved	** 28.910 K/Strand
*Low Relaxation	** 30.975 K/Strand
*Special Low Relaxation	** 33.818 K/Strand

Note: Some designs may require the use of 0.6" diameter strand. If so, the strand should be noted as Low Relaxation with an initial tension of 43.95 K/Strand. Use of 0.6" diameter strand will require prior approval of the Bridge Engineer or Assistant Bridge Engineer.

_____ The concrete in the AASHTO girders shall have a minimum of _____ compressive strength prior to receiving prestressing force and a minimum 28 day compressive strength of _____. *(See designer sketches for compressive strength requirements)*

4500 psi	5000 psi
5500 psi	6000 psi
6500 psi	7000 psi
7500 psi	8000 psi

_____ Strands shown thus (o) shall remain unbonded by using plastic sheathes around cables for a distance of ___ from the ends of the girder.

_____ All strands not to be encased in concrete shall be cut flush at each end of the girder. Coat girder ends where strands are cut with an approved epoxy coating.

_____ Threaded bars, cap screws, inserts, and sole plates (if applicable) shall be included in the Bid Item " Pretensioned-Prestressed Concrete Girders, Type ____".

_____ Girder ends shall be vertical in final erected position.

_____ Threaded inserts and connection angles are required on both faces of all girders at the fixed end and both faces of the exterior girders only at the expansion end unless skid blocks are used. See Standard Dwg. I-131for details.

4. MISCELLANEOUS

_____ Show Reinforcing Bar Details and verify dimensions shown.

_____ Show plan view of stirrup flare detail for skewed girders.

_____ Show, label and dimension buildup over girder diagram based on designer sketches.

"SPAN DETAILS" SHEET
(For Steel Girders)

1. PLAN VIEW

_____ Overall span length from working point to working point (For end span, show dimension from Beginning/End of bridge to centerline of bent. For interior span, show dimension from centerline of bent to centerline of bent).
_____ If skewed, show skew angle.
_____ On skewed bridges, show transverse dimensioning on left end of span and show skewed dimensioning on right end of span.
_____ On curved bridges, show dimensions along both edges of slab and along centerline of bridge.
_____ Show joint reference (i.e. Begin, End of Bridge, working line of joint, centerline of bent no. 2, etc.) and begin or end span stations.
_____ Show working line reference (i.e. Begin, End of Bridge, centerline of Bent No. 2, etc.)
_____ Show required joint opening @ 70 degrees F
_____ Note open joints in barrier rail and refer to Standard Dwg. I-131for details. (For continuous spans, barrier rail joints should also be provided at all bent locations.)
_____ Show deck drains (5 or 6 on one side) and note typical on both sides, if applicable, and reference Special Project Dwg. SBD-1 for details.
_____ Provide note for deck drain spacing if different than Standard Dwg. I-131, and verify that the following is addressed:

1. Space deck drains at 5'- 0" o.c. for normal crown bridges and reduce to 4'- 0" o.c. for bridge widths greater than 44 feet.
2. If bridge is in full superelevation and gutter to gutter dimension is greater than 28 feet, reduce deck drain spacing to 4'-0" o.c.
3. If bridge is in full superelevation, omit deck drains on high side of span.
4. Omit drains in portion of span over roadway or tracks and in transition region of barrier rail.
5. If low point of vertical curve falls on the bridge, decrease deck drain spacing in this area. If necessary, consult Bridge Hydraulic Engineer for assistance in determining required deck drain spacing at low point of vertical curve

_____ Identify Bridge Joint Armor Plates and reference Standard Dwg. I-131
_____ If applicable, identify expansion dams and reference table for required opening in increments of 10 degrees from 20 degrees F to 120 degrees F.
_____ Locate girders, gutterline and outside edge of slab with respect to centerline of survey or profile grade. Show overall width of bridge and barrier rail width.
_____ Identify Centerline of Bridge and reference it to centerline of roadway, construction, survey, profile grade, or baseline as applicable.
_____ Show numbering of girders left to right, stations ahead.

_____ Show Transverse Deck Reinforcement (5 or 6 bars) all the way across the bridge.
For skews greater than 20 degrees, use cutoff bars in skewed portion of deck and show bars perpendicular to centerline of bridge. Determine number of required cutoff bars by setting length of last cutoff bar at 18 inches.
For skews 20 degrees and less, detail transverse deck reinforcement to be placed along skew.

_____ For 40' bridge width, no skew, show optional splices for top and bottom transverse deck reinforcing bars. (See superstructure reinforcement guideline of this manual)

_____ Show finished deck elevations at beginning and end of bridge and working line of joint locations at gutter lines, girder lines, centerline of bridge, profile grade, as applicable.Show all elevations at required locations or in tabular form.

2. DECK CROSS-SECTIONAL VIEW

_____ Identify the section being represented by the view. (i.e., TYPICAL CROSS SECTION)
_____ Number girders left to right and show girder spacing and dimension overhang.
_____ Show typical deck thickness (between girders), deck reinforcement and reinforcing cover.
_____ Show deck thickness at outside edge of slab.
_____ Show deck drains if applicable.
_____ Show drip bead.
_____ Reference Special Project Drawings for applicable details in this section.
_____ Provide splice note for longitudinal deck reinforcing Bars D and E if span is greater than 60 feet in length. (Note: Splice Bars D and E a minimum of 24 Diameters.)
_____ When applicable, provide note stating that with prior approval of the Bridge Engineer, the contractor may alter the layout of Bars Type D and E to accommodate the use of standard bar lengths.
_____ For 40' bridge width, no skew, identify optional splices for top and bottom transverse deck reinforcing bars.
_____ Show gutterline to gutterline, gutterline to edge of slab, and out to out dimensions.
_____ Locate centerline of bridge or profile grade and show dimensioning to centerline of girders from this control line.
_____ Indicate girder type (i.e., wide flange W 36x __ " or __" welded plate girder)
_____ Show cross frames.
_____ Show deck slope and refer to Standard Dwg. I-131for 6' parabolic crown details if applicable.
_____ Verify that the slopes shown on the Deck Cross-Sectional View agree with the slopes shown on the roadway typical section.
_____ Locate and show number and spacing of Bars E in bottom of slab.
_____ Locate and show number and spacing of Bars D in overhang.

3. POURING SCHEDULE

_____ If continuous steel spans, provide pouring schedule. Pour positive moment locations 1st, end of span pour 2nd, negative moment locations pour last. If expansion dams are required at the ends of continuous welded plate girder spans, then utilize short pours (10 to 15 feet at the ends of the continuous unit as final deck pours

4. ESTIMATED QUANTITIES

_____ Provide quantities for superstructure concrete, structural steel superstructure, structural steel, and steel reinforcement.

_____ If details address more than one span or continuous unit, separate quantities for each span/continuous unit or add note to indicate that quantities shown are for one span only.

FRAMING PLAN & GIRDER DETAILS"
(For Steel Girders)

FRAMING PLAN

_____ Provide overall span lengths.
_____ Locate centerline of girders and provide spacing.
_____ On skewed bridges, show transverse dimensioning on left end of framing plan and show skewed dimensioning on right end of framing plan.
_____ On curved bridges, show transverse dimensioning on left end.
_____ Number girders left to right looking stations ahead. An exception to this policy may be when project is for dual bridges and detailing is symmetrical about centerline of alignment. It may benefit detailing to number girders for left lane bridge looking stations ahead right to left for symmetry. This should be reflected on the span detail sheet also.
_____ Locate field splices and coordinate labeling with field splice details.
_____ Locate centerline of bearings and centerline of bents
_____ Identify cross frames and show spacing. For skewed bridges, insure that interior cross frames are aligned (placed back to back) rather than staggered to fit the skew of the structure.
_____ Locate intermediate stiffeners.
_____ Show bearing stiffeners on outside face of exterior girders.
_____ On curved bridges, show girder radii (i.e. R = ___') for each girder line.

GIRDER ELEVATION

_____ Locate centerline of bearings/bents and centerline of field splices.
_____ Show dimensioning from end of girder to centerline of bearing.
_____ Locate Jacking stiffener plates if applicable.
_____ Dimension top and bottom flange plates and web plates and specify plate sizes.
_____ Specify long seam weld requirements for web to flange weld.
_____ Locate and dimension longitudinal web stiffener plate (when applicable) and specify weld requirements. Reference and provide a detail for any special end preparation required for the longitudinal stiffener.
_____ Indicate shear stud spacing.
_____ Locate flange tension zones (Based on total dead load).
_____ Show girder arc lengths for curved bridges in tabular form.

STRUCTURAL STEEL NOTES (as applicable)

_____ All structural steel shall conform to AASHTO M270 Grade 36 unless otherwise noted.
_____ All structural steel shall conform to AASHTO M270 Grade 36 except flange plates, web plates, flange and web splice plates, bearing stiffeners, _____, _____, which shall conform to AASHTO M270 Grade 50.
_____ Girders shall be shop cambered for dead load deflection *(and vertical curvature when applicable)*. Girder webs shall be cut to provide camber. For simple spans expand this note to say total dead load camber shall be increased by 10% to compensate for additional deflection due to concrete shrinkage.

_____ Girder ends, bearing stiffeners, and jacking stiffeners if applicable, shall be vertical. All other stiffeners, shop and field splices shall be perpendicular to flanges.

_____ All shop connections shall be welded. All field connections shall be bolted with 7/8" diameter - M 164 High Strength Bolts in 15/16" diameter holes unless otherwise noted.

_____ All nuts, bolts, and washers shall be galvanized in accordance with AASHTO M 298 Class 50.

_____ No field welding, except for installation of shear studs, will be permitted on the structural steel superstructure unit.

_____ Shear studs shall conform to Section 508.03 of the Standard Specifications. Shear studs are not be cut in the field unless approved in writing by the Bridge Engineer.

_____ Stability of the steel girder units during all phases of construction shall be the sole responsibility of the contractor. Any temporary cross bracing or support deemed necessary by the contractor to insure stability of the structure until construction is completed shall be provided by the contractor at no additional cost to the project. Working drawings for such bracing, if required, shall be submitted in accordance with Article 105.02(c) of the Standard Specifications.
(The above note is required for simple and continuous span units)

_____ The bridge engineer will not accept an alternate design utilizing AASHTO M 270 Grade 50W steel on this bridge. (Shown on the front sheet also)

_____ If rolled beams are detailed in the plans then provide the following note:

> The contractor may substitute, on an equal basis, welded plate girders for the wide flange beams. The plate girders are to be of equivalent cross-sectional dimensions as the wide flange beams. Connection plates are to remain as shown for the wide flange beams. A __" fillet weld will be required for the flange-to-web weld.

_____ The Structural Steel Unit is design for total dead load fit.

_____ For Curved Welded Plate Girders the designer should determine if heat curving is permissible. If heat curving is permissible then the following note should be provided:

> The heat up-set method as described in Section 836.19 of the Standard Specifications may be used to provide horizontal curvature in the welded plate girders.

If heat curving is not permissible then the following note should be provided:

> Horizontal curvature of the welded plate girder shall be accomplished by cutting flange plates to the required plan. Heat curving of material shall not be allowed.

_____ With the approval of the bridge engineer, flange and/or web plate material may be spliced if required lengths are unobtainable. Any such splice shall be made in the shop using AWS full penetration submerged arc welds. The location of the approved splice shall be at approximately the ¼ point and the ¾ point for the required material length. No flanges shop splice shall be permitted within 2'-0" of a web shop splice.

"CROSSFRAME and STIFFENER DETAILS"
(For Steel Girders)

_____ Crossframe members (except for diagonals) should be shown level and located a minimum distance of 4" from inside edge of controlling flange.

_____ For horizontal members of crossframe connection, utilize single component members (i.e., one angle, "W" or "T" section as required in conjunction with gusset plates) in lieu of back to back paired angles. *(Paired angles present problems during painting operations).*

Preference is to utilize angles for intermediate diaphragm horizontal and diagonal members and combination of angles and a horizontal channel for bearing diaphragm. Design requirements may dictate that other type members be provided to develop required bracing.

_____ End and intermediate crossframes should be attached to bearing and connection plates by means of gusset plates that are shop welded to the members and then bolted to the bearing and connection plates.

_____ Locate and size connection plates and gusset plates. Show minimum edge distance to bolt holes and bolt hole spacing.

_____ Locate and size fill plate between diagonals.

_____ Specify weld requirements, clip details, and other details required for connection plates, stiffener plates, gusset plates, and fill plate.

A. Bearing connection plates
- Full penetration weld to bottom flange. Clip outside corners of plate ¾ to ¾ whenever bearing plate is flush with edge of flange.
- When bearing plate extends past flange, clip excess overhang plus ¾ inch on outside corner on 1 to 1 slope cut.
- Fillet weld to top flange (specify weld size as required by design). Designate this joint preparation as "Mill to bear".
- Fillet weld to web (specify weld size as required by design)
- Clip inside corners of plate adjacent to web 1 ½ to 1 ½

B. Intermediate connection plates
- Fillet weld to top and bottom flange and web (specify weld size as required by design)
- Clip inside corner of plate adjacent to web 1 ½ to 1 ½

C. Intermediate stiffener plates
- Fillet weld to web (specify weld size as required by design)
- Fillet weld to compression flange (specify weld size as required by design)
- Indicate "Tight Fit" as condition to provide on tension flange

D. Gusset plates
- Fillet weld to angles and/or channel (specify weld size and length of weld as required by design).
- Specify bolt spacing for gusset plate to connection plate detail.
- Indicate horizontal and vertical distance from centerline of outside row of bolt holes to edge of connection plate. (Typically 1 ¾" for 7/8" diameter high strength bolts in 15/16" diameter holes).

E. Fill plate
- Specify plate thickness
- Fillet weld to cross bracing (specify weld size as required by design)

"FIELD SPICE DETAILS"

_____ Provide plan and elevation view for each field splice condition and coordinate labeling of field splice detail with labeling provided on the "Framing Plan and Girder Elevation" detail sheet.

_____ PLAN VIEW

1. Locate centerline of girder.
2. Locate centerline of splice.
3. Dimension bolt spacing for flange splice.
4. Indicate edge distance from outside row of bolts to edge of girder or splice plate as applicable.
5. Provide taper detail when varying width flanges are to be spliced. (1 unit width to 2.5 units length).
6. Provide ¼" total opening between girder ends.

_____ ELEVATION VIEW

1. Locate centerline of splice.
2. Indicate ¼" gap between girder ends (1/8" either side of centerline of splice)
3. Dimension bolt spacing for web splice.
4. Indicate edge distance from outside row of bolts to edge of splice plate. (1 ¾" for 7/8" diameter bolts)
5. Specify web plates and top and bottom flange plate dimensions.
6. Specify web splice plates, and top and bottom flange splice plate dimensions.
7. Specify flange (and web if required) fill plate dimensions.
8. Insure that a minimum of 3" is being provided between the inside edge of the inside flange splice plates and the first horizontal row of web splice bolts.

"MISCELLANEOUS DETAILS"
(For Steel Girders)

Shear Stud Detail

_____ Provide cut section of girder to indicate how studs are to be spaced relative to centerline of girder.
_____ Indicate number, diameter, and length of shear studs.
_____ Verify that no studs are located in a top flange tension zone.
_____ Verify that no studs are located on the top flange splice plate, unless required by design.
_____ Locate outside studs a minimum of 2 inches from edge of flange.

Jacking Frame Details

_____ Verify that plan details agree with designer sketches. Jacking frames should only be provided when other means of temporarily lifting the superstructure are not going to be available. (i.e., sufficient room to place jacks directly under girder between girder bottom flange and top of substructure cap)

Shop Splice Details

_____ The shop splice detail(s) should clearly indicate any special requirements for the splice (i.e., tapering of flanges, 2 foot offset between web shop splice and flange shop splice, flush grinding of weld, etc.)

Bottom Flange to Bearing Detail

_____ Whenever rocker type bearings are being specified or design requires a bolted connection through girder bottom flange, a plan view detail of the bottom flange should be provided to locate anchor bolt holes/slots relative to centerline of girder and centerline of bearing.

_____ Paired anchor bolts either side of the centerline of bearing are recommended since locating anchor bolts along centerline of bearings can present problems during installation of the anchor bolt because of conflict with the bearing diaphragm.

Camber Diagram

_____ Provide camber diagram that includes camber ordinates due to steel only and camber ordinates for total dead load camber including steel. For spans 100 feet and less, ordinates should be shown at 1/10-point locations between bearings. For spans greater than 100 feet, ordinates should be shown at 1/20-point locations between bearings.

Top Flange to Expansion Dam Detail

_____ Whenever expansion dams are being specified, a plan view detail of the top flange should be provided to locate bolt slots relative to centerline of girder and centerline of bearing. Slots are recommended to allow room for adjustment during installation of the expansion dam.

Expansion Dam Details

_____ An expansion dam should be provided whenever calculated span movement exceeds 2 ¼". For movements less than 2 ¼", a standard open joint with bridge joint armor plates should be provided.

_____ When an expansion dam is required, a Plan and Section View detailing the expansion dam each side of the joint should be provided. Details should include but not necessarily be limited to the following:

_____ PLAN VIEW

- Thickness and overall length of expansion dam plates.
- Location of centerlines of girders either side of the joint relative to expansion dam plates.
- Dimensioning of bolt locations relative to centerline of girder for attaching expansion dam to top flange of girder.
- Indicate expansion dam stud/anchor dimensions (i.e., diameter and length) and spacing of stud/anchors.

- Indicate how expansion dam is to be connected to top flange (i.e., w/ __" diameter high strength anchor bolts, __" diameter threaded rods, etc.)
- Indicate dimension of holes/slots in top of expansion dam for anchor bolt attachment and note that these holes/slots are to be recessed to accommodate the head of the anchor bolt. Note that recesses are to be filled after installation of the expansion dam with an approved epoxy sealant.
- Indicate the centerline of the open joint and "flag" the centerline to a schedule of expansion dam openings for various steel temperatures ranging from 20 to 120 degrees F.
- Provide detail for cutting of teeth in expansion dam. The expansion dam is cut from a single plate using a ¼" cut line. Teeth are typically spaced 2 ½" on center and cut with a 1" radius.

_____ TRANVERSE SECTION VIEW

- Show typical deck cross section either side of the joint.
- Locate centerline of girders and anchoring system (bolts and/or threaded rods) relative to girder centerlines.
- Show required deck slope or refer to appropriate bridge sheet for deck elevations at expansion dam location(s).
- Show out-to-out dimension for expansion dam.
- Show distance from top of deck to top of girder at centerline bearing locations.
- Locate bolster blocks (steel girders only) and show required thickness at each corner of bolster block. Add note to provide 1/16" shim plates as necessary for adjustment of expansion dam during installation.
- Include ¼" thick shim plate under bolster block to allow for maximum +5/16" fabrication tolerance allowed by AWS for overall girder depth.
- Provide detail for drain trough that attaches below expansion dam plates. Insure that sufficient slope has been provided on trough to allow for drainage. Trough should be dimensioned for various temperatures. Troughs are typically detailed to slope downward symmetrically from the centerline of bridge.

_____ CROSS SECTION VIEW

- Specify 3/16" minimum thickness for neoprene trough.
- Show connection of trough to expansion dam using ½" mechanically galvanized hex head bolts spaced 18" on centers max.
- Use 2"x2"x ¼" continuous angles attached to vertical surface of expansion dam to mount neoprene trough and locate these angles relative to the bottom face of the expansion dam plate. A minimum of 3" should be provided between the top surface of the angle and the bottom of the expansion dam for installation of the bolts for the trough.
- Use a 3/8" x 1 ½" continuous backing bar to secure the trough to the angles.
- Heads of the hex bolts should be shop welded to the angle with a 3/16" fillet weld. Fore ease in field installation of the trough, bolts on one side of the trough should be oriented so that the nut side of the attachment will be downward.

- If expansion dam is for steel girder joining concrete girder, insure that vertical plate on side of concrete girder is provided with ½" diameter vent holes on 12" centers located 1" from the top of the plate.
- Indicate required welding (i.e., expansion dam plate to support plate, anchor angles to support plates, anchor angles to bolster block, trough support angles to vertical plates, etc.)

_____ Show Trough Detail and layout for fabrication purposes.

EXPANSION DAM QUANTITIES

- Provide estimated quantity for expansion dam.
- All structural steel in the expansion dams shall conform to AASHTO M270 Grade 36 and shall be included in Pay Item 508-B, Each – Structural Steel Superstructure.

EXPANSION DAM NOTES

- All structural steel in the expansion dam shall conform to AASHTO M270 Grade 36.
- The reinforced neoprene trough shall conform to Section 832.06 of the Standard Specifications. A 12"x12" check sample shall be cut from the actual neoprene material to be used as the trough. An ALDOT inspector shall witness cutting of the check sample. The neoprene trough shall be considered a subsidiary obligation of pay item 508-B, Each – Structural Steel Superstructure.
- All welding shall be performed in accordance with the Standard Specification and Special Provisions. All full penetration welds shall be ultrasonically tested. A minimum of 10% of all fillet welds shall be tested by the magnetic particle method.
- The entire expansion dam assembly shall receive a System 1-A prime coat in the shop. Areas that will be inaccessible after erection shall receive the maximum coating thickness recommended by the paint manufacturer for a single coat. The prime coat shall be compatible with the paint to be applied in the field.
- After fabrication and shop painting is completed, the expansion dams shall be completely shop assembled. The shop assembled expansion dams shall be shipped to the construction site as a complete unit.
- The toothed expansion dam plate sections shall be cut from a single plate measuring __" thick x ___" wide x __' - __" long.
- All bolts, (threaded rods, if applicable), lock washers and nuts shall be galvanized in accordance with AASHTO M298, Class 50.
- The top flange of the plate girders and the expansion dams shall be drilled to the same metal template.

"BEARING DETAILS" SHEET"
(Type 2, 4, and 5 Elastomeric Bearings)

Designers are encouraged to utilize bearing details as provided on Standard Dwg. I-131 whenever design will permit.

When special bearing design is required:

_____ Check slope of girder to verify type bearing specified. If slope is 0.75 percent or less, Type 2 bearings may be used. If slope is greater than 0.75 percent, a bearing type with beveled bearing plates should be specified. For example, Type 4 or 5 elastomeric bearings for prestressed concrete girders.
_____ For Type 2, 4, and 5 bearings, specify 12 gage steel plates.
_____ Indicate field weld size for attachment of Type 4 and 5 bearings to sole plate.
_____ Indicate that bearing plate and sole plate in prestressed girder have been shown to be galvanized per specifications.
_____ Check that holes in bearing plates or clip angles will work with required anchor bolt holes and slots.
_____ Check weld specified between girder and top plate of Type 4 or 5 elastomeric bearing.

"INCREMENTAL ELEVATIONS SHEET"

_____ Incremental point bridge sheet reference

Incremental point elevations are required:

1. Whenever all or a portion of the bridge is located within the limits of a vertical curve.
2. Whenever a portion of the bridge is located within the limits of a transition between normal crown and full superelevation.
3. Bridge is in horizontal curve and design requires chorded girders.
4. Bridge to be constructed on grade and spans(s) within grade utilize steel girders.

Set up incremental point elevation sheet on a 1:1 scale and use a minimum text size of 0.125. Use as few sheets as possible. For overall span length less than 100 feet in length, tenth point elevations should be provided. For span lengths over 100 feet, twentieth point elevations should be provided.

"ABUTMENT DETAILS" SHEET(S)

1. PLAN

_____ Show overall abutment dimensions.
_____ Number and label centerline of girders, centerline piles or centerline drilled shafts for Abutment No. 1 from right to left looking back station.
Number and label centerline of girders, centerline piles for End of Bridge Abutment from left to right looking station ahead.
_____ Dimension girder spacing along back of abutment backwall.
_____ Dimension pile spacing at centerline bearing.
_____ Show and label centerline of bearing.
_____ Locate centerline of piles. Verify that pile centroid is under the centerline of bearing and the centerline of girders.
_____ Verify that pile type and size specified on the bridge drawing agree with recommendations of the Foundation Report.
_____ When anchor bolts are required show anchor bolt type and location. Indicate anchor bolt diameter and refer to anchor bolt detail if different than detailed on Standard Dwg. I-131.
_____ Show and label backwall thickness. Use 12" backwalls on BT54, BT-63, and BT-72. Use 9" backwalls on AASHTO Type I, II, and III girders.
_____ Show and label elastomeric bearing pads. Specify Mark No. if bearings from Standard Dwg. I-131 are being used. Specify size and type if standard bearings are not being used. Reference applicable sheet or Standard Dwg. I-131for details.
_____ When girders are on chords show angle between begin or end of bridge and chord of girder in tabular form.
_____ Show all elevations at required locations or in tabular form.
_____ Verify skew and locate with respect to centerline of abutment.

2. ELEVATION – PILES AND DRIILED SHAFTS

_____ Detail beginning of bridge abutment looking back station. Detail end of bridge abutment looking stations ahead. Detail and label reinforcement in backwall on left side. Detail and label cap and drilled shaft (if applicable) reinforcement on right side.
_____ Detail top of backwall according to finish grade elevations in geometry run. If bearing elevation difference is greater than 12" between the exterior girders, then sloping of the abutment is required. Less than 12" difference in bearing elevations can be handled by varying the height of the pedestals.
_____ When sloping of cap is required, show slope in percentage with four decimal places.
_____ Show bearing elevations in tabular form. Show wing heights based on elevations.
_____ Detail pedestals as level. Show and label minimum pedestal thickness of 4 inches at centerline of bearing.
_____ Label top and bottom of cap as level, if applicable.
_____ Number piles/shafts for Abutment No. 1 from right to left. Number piles/shafts for end of bridge abutment from left to right.
_____ Locate and dimension Drilled shafts.
_____ Specify pile size.
_____ Use #5 bars at 8" o.c. for horizontal reinforcement in backwall and #5 bars at 12" o.c. for vertical reinforcement in backwall unless design specifies otherwise.

_____ Show and label pile cap plates/channels if steel pile abutment and that pile cap plates/channels required are detailed on Standard Dwg. I-131 or else provide detail.
_____ Verify that direction of cap cut section agrees with section detail shown and is cut thru bars AA.
_____ Label optional construction joints in backwall 3" above top of cap.
_____ Label splice location for cap and backwall reinforcing on drilled shaft abutments whenever splicing is required. *(Refer to REINFORCEMENT RECOMMENDATIONS section of this document for additional information regarding splicing of reinforcing steel.)*

3. END VIEW – PILE ABUTMENT

_____ Detail abutment end view with note to slope cap to drain and note top of pedestal as level and show and label optional construction joint.
_____ Dimension cap overhang on drilled shaft abutments. *(Refer to DRILLED SHAFT SECTION of this document for additional information.)*

4. SECTION A-A

_____ Show appropriate cap and backwall dimensions.
_____ Label pile size and specify batter on piling, i.e., 1½"/ft. Locate centerline of piles. Verify that center or centroid of pile group is under centerline of bearing.
_____ Label Bridge Joint Armor Plate
_____ Show pedestal when applicable and without reinforcement.
_____ Label reinforcement and dimension concrete cover over reinforcement. Maintain 3" cover on bottom mat of abutment reinforcement, 2" cover on stirrups and Bars C, and 1½" cover on backwall reinforcing.
_____ When slope paving is being specified to protect end slope at abutment provide 3" wide x ½ cap depth "lip" (extension) on front face of abutment cap to allow slope paving to tie into abutment.
_____ Dimension and label optional construction joint in backwall 3" above top of cap.
_____ Show 1'-0'' pile embedment dimension.
_____ Label and identify pile cap channel.

5. MISCELLANEOUS DETAILS/INFORMATION

_____ Show plan view of pedestal details with anchor bolts and dimensions and show distance from front of backwall to edge of pedestal. (Provide 5" min.).
_____ Show pedestal reinforcement in a separate detail. Show 2" clearance to Bars U.
_____ If pedestal height is greater than 8", then pedestal reinforcement should be confined mid-height of pedestal with U-shaped #4 reinforcing bars (Bars Z). Add a Bar Z for each additional 6" of pedestal height, equally spaced. Show 1½" clearance to Bars Z.
_____ Show reinforcement bar details.
_____ Show pile tip, bottom of drilled shaft and bottom of footing elevations as applicable.

6. ESTIMATED QUANTITIES

_____ Show in the following order: steel reinforcement, structural steel and substructure concrete quantities with pay item numbers for each abutment or specify per abutment. Include drilled shaft reinforcement if applicable and flag reinforcement to indicate that drilled shaft reinforcement is included in reinforcement total quantity.

7. NOTES

_____ For bridge joint armor plate, pile cap plate and pile channel details, see Standard Dwg. I-131.
_____ Provide length for vertical Bars B along with note to fabricate all Bars B to same length, maintaining 2" concrete cover at top of bars.
_____ Provide note/location for splicing bars. Refer to "Reinforcement Section" of this document for splicing requirements.
_____ Provide note that top of backwall shall conform to slope of bridge deck and have a broom finish.
_____ When anchor bolts or anchor bolt wells are being specified add a note stating that cap and pedestal reinforcement shall be adjusted as necessary to insure correct placement of anchor bolt wells or anchor bolts.
_____ If skid blocks (when necessary) are specified in conjunction with Type 4 bearings, provide a note stating that skid blocks shall be poured separately from the abutment cap, reinforcement should be drilled in and that a Type II epoxy adhesive shall be applied to the construction joint location just prior to pouring the skid blocks.

"BENT DETAILS" SHEET(S)

1. PLAN

_____ Show overall cap dimensions
_____ Show spacing of girders along working line of joint.
_____ Number and identify girders left to right.
_____ Locate and identify centerline of cap with respect to working line of joint.
_____ Locate and identify centerline of bearings and centerline anchor bolts.
_____ Verify skew and locate with respect to centerline of bent.
_____ Locate centerline of bent with respect to centerline of bridge, survey or profile grade.
_____ When anchor bolts are required show anchor bolt type and location. Indicate anchor bolt diameter and refer to anchor bolt detail if different than detailed on Standard Dwg. I-131.
_____ Show and label elastomeric bearing pads. Specify Mark No. if bearings from Standard Dwg. I-131are being used. Specify size and type if standard bearings are not being used. Reference appropriate sheet or Standard Dwg. I-131 details.
_____ Show and label fixed/expansion sides and verify with GPAE.
_____ Show dimension of working line of joint to centerline of cap if cap has eccentricity.
_____ When girders are on chords show angle between working line and chord of girder in tabular form.
_____ Show all elevations at required locations or in tabular form.

2. ELEVATION

_____ Show and label column width/diameter or drilled shaft diameter.
_____ Number columns from left to right, ahead station.
_____ Show cantiliver dimensions and centerline to centerline dimension between columns with respect to centerline of bent. Detail cap reinforcement on left and column/shaft reinforcement on right.
_____ Show cut section arrows for cap and column, i.e. A-A, B-B. etc.
_____ Show and dimension reinforcement splices in cap and columns when splicing of reinforcement is required.
(Refer to "Reinforcement Section" of this document or design sketches for splice lengths and location).
_____ For column height (top of footing or top of shaft to bottom of cap) is greater than 20', show and label construction joint and reference section 501 of Standard Specifications for column height concrete pour requirements.
_____ Detail cap and pedestals according to bearing elevations in geometry run. If bearing elevation difference is greater than 12" between the exterior girders, then sloping of the bent cap is required unless a level cap is approved by the Bridge Engineer. Less than 12" difference in bearing elevations can be handled by varying the height of the pedestals.
_____ For sloped cap show slope in percentage using four decimal places.
_____ Label top and bottom of cap as level, if applicable.
_____ Detail pedestals as level. Show and label minimum pedestal thickness of 4 inches at centerline of bearing.
_____ Locate optional construction joint in riser 3" above top of cap if cap has riser and riser height is greater than 9".
_____ Locate construction joint in column 6" above top of footing.
_____ Provide cap elevations and show cap depth.
_____ For pile footings, locate and show pile size.

_____ Show the bottom of footing elevations for spread/rock footing and drilled shaft tip elevations as "approximate". Show the actual bottom of footing elevation for pile footing (without the wording "approximate").
_____ Show approximate groundline elevation.

3. END VIEW

_____ Note top of pedestals as level
_____ Dimension cap overhang with respect to face of column or drilled shafts.
_____ Show and label optional construction joint in riser 3" above top of cap if cap has riser and riser height is greater than 9".
_____ For pile footings, locate and identify piles. Note battering of outside piles if applicable and provide batter requirements. Show dimension from face of column to edge of footing.
_____ Show overall footing dimensions and label centerlines
_____ For pile footing, indicate batter on piles
_____ Detail, dimension and label piles.
_____ Detail and dimension construction joint 6'' above top of footing.
_____ Detail and dimension 2' pile embedment and dimension 4" clearance between mat and top of piles .

4. CAP SECTION

_____ Show, label and dimension centerline of cap and centerline of bearing. If there is cap eccentricity, show dimension between working line and centerline of bent.
_____ Label reinforcement and show 2" reinforcement concrete cover.
_____ Set minimum spacing between all double mats of reinforcement at 4" unless specified differently by designer sketches.
_____ Show width and depth of cap and indicate depth as minimum if cap is stepped.
_____ Orientation of cut section shall agree with elevation view.
_____ Locate and dimension optional construction joint in riser 3" above top of cap if cap has riser and riser height is greater than 9".
_____ When double stirrups are required by design, insure that horizontal out-to-out dimension for stirrup bar has been calculated so that main steel can be placed without conflict with placement of the anchor bolt wells.

5. COLUMN SECTIONS

_____ Show a section for every condition change. Label reinforcement and show reinforcement concrete cover.
_____ Show column dimensions.
_____ Show and dimension hoop lap on round columns.

6. FOOTING SECTION DETAILS

_____ Show overall footing dimensions and label centerlines.
_____ Label reinforcement and dimension reinforcement concrete cover. Detail, dimension and label piles.
_____ Verify that orientation of cut section agrees with elevation view.
_____ For pile footing, indicate batter and batter direction on piles.

7. MISCELLANEOUS DETAILS/INFORMATION

_____ Show plan view of pedestal details with anchor bolts and/or anchor bolt wells and dimensions and skid block dimensions when applicable.
_____ Show pedestal and skid block reinforcement in a separate detail. Show 2" clearance to Bars U.
_____ If pedestal height is greater than 8", then pedestal reinforcement should be confined mid-height of pedestal with U-shaped #4 reinforcing bars (Bars Z). Show 1 ½" clearance to Bars Z.
_____ Show reinforcement bar details.
_____ Show pile tip, bottom of drilled shaft and bottom of footing elevations as applicable.

8. NOTES

_____ Provide note/location for splicing bars. Refer to "Reinforcement Section" of this document for splicing requirements.
_____ When anchor bolts or anchor bolt wells are being specified add a note stating that cap and pedestal reinforcement shall be adjusted as necessary to insure correct placement of anchor bolt wells or anchor bolts.
_____ If skid blocks are specified in conjunction with Type 4 bearings, provide a note stating that skid blocks shall be poured separately from the abutment cap, reinforcement should be drilled in and that a Type II epoxy adhesive shall be applied to the construction joint location just prior to pouring the skid blocks.

9. ESTIMATED QUANTITIES

_____ Show in the following order: steel reinforcement, and substructure concrete quantities with pay item numbers for each bent or specify per bent. Include drilled shaft reinforcement if applicable and flag reinforcement to indicate that drilled shaft reinforcement is included in reinforcement total quantity.

10. SPLICING REQUIREMENTS FOR REINFORCEMENT

_____ For all reinforcement in cap, column and drilled shaft, verify that correct splicing has been provided. (See "Reinforcement Section" of this document for maximum length of bar that should be specified without splicing being considered.)

11. COLUMN CONSTRUCTION JOINTS AND STRUTS

_____ Specifications permit the contractor to pour up to a 30-foot column height if steel forms are used. Insure that column splices accommodate pour requirements. Columns greater than 40 feet in height should be provided with strut. Vertical strut spacing should not exceed 40 feet.

12. SPECIAL NOTES

_____ For large piers that may require structural steel cages for support of designed reinforcement for columns / footings, provide the following notes:

a. Structural steel cages may be utilized by the contractor for tying and placement of reinforcement cages for the footings and columns. If the contractor elects to use structural steel cages to support the designed reinforcement, then details of the proposed structural steel cage(s) shall be submitted to the Bridge Engineer for review prior to beginning steel tying operations for the columns and/or footings.
b. All steel utilized in the structural steel cages shall be new.
c. The cages shall be accurately fabricated to insure that adequate concrete cover as dimensioned on the bridge plans is provided on the reinforcing steel.
d. Footing reinforcement shall not be connected to the structural cage for the columns.
e. There will be no direct payment for the structural steel cages. Cost for furnishing, fabrication, and installation of the cages shall be considered a subsidiary obligation to the 502-A "Pounds, Steel Reinforcement" pay item.

"DRILLED SHAFT DETAILS" (ABUTMENTS OR BENTS)

1. DRILLED SHAFT ELEVATION

_____ For drilled shaft foundations show top of shaft as approximate (except when shaft extends to bottom of cap). Confirm top of shaft elevation with core boring hub elevations (groundline profiles) or waterline.
_____ When permanent casing is required show top and bottom of casing elevations as approximate elevations. Top of permanent casings is to be 2' above water line at time of survey.
_____ Detail construction joint between drilled shaft concrete and substructure concrete and label accordingly.
_____ Show drilled shaft dimensions.
_____ Provide 6" of concrete cover between main reinforcement and bottom of hole. Provide 12" of concrete cover between hoops and bottom of hole.
_____ Show bottom of drilled shaft as approximate as required.

2. DRILLED SHAFT SECTIONS

_____ Provide 6" of concrete cover on shaft hoop reinforcement. Less side cover (4") may be used for shafts socketed into rock.
_____ Show a section for every condition change. Label reinforcement and show reinforcement concrete cover and bar lap dimension.
_____ Show drilled shaft dimensions.
_____ Show and label permanent drilled shaft casing if applicable.

3. NOTES

Top of Shaft Elevation Note:

Top of shaft elevations are approximate only and may need to be adjusted depending on the actual groundline or waterline elevation at the location of the shaft.

Bottom of Shaft Notes:

Shaft tip elevations shall be shown as "approximate" whenever core borings indicate that the following soil conditions will exist:

a. Borings indicate that contractor should encounter sound rock at the surface and that this rock layer or better material will continue for the depth of required rock socket.
b. Borings indicate that contractor should have to auger through soil before encountering sound rock and that once sound rock is encountered, this rock layer or better material will continue for the depth of required rock socket.
c. Borings indicate that contractor may encounter mud filled seams or voids in the rock layers before reaching the required plan shaft tip elevation.

d. Borings indicate that contractor should have to auger through soil and/or core through weathered or undesirable rock before encountering sound rock and that once the sound rock layer is reached, this rock layer or better material will continue for depth of required rock socket. (For the purposes of interpreting this requirement regarding "approximate" shaft tip elevations, weathered or undesirable rock will be defined as rock represented in the foundation report by low core recovery percentages, CR < 50%, and/or rock quality designation percentages, RQD <50%.) Lower CR and RQD percentages may be used, if in the judgement of the engineer, the specified rock would provide a structurally acceptable rock socket that would satisfy both lateral and axial load requirements. All exceptions to the above definition of weathered or undesirable rock should have the concurrence of the Materials and Tests Bureau Geotechnical Section.

For conditions "a" and "b" above, the following notes should be provided regarding the shaft tip elevation:

Bottom of shaft elevations are approximate only and may require adjustment to insure a minimum __ foot socket into material classified as " _____ " on the test boring record sheet.

Bottom of shaft elevations shall not be altered without prior approval of the Bridge Engineer.

For condition "c" above, the following notes should be provided regarding the shaft tip elevation:

Bottom of shaft elevations are approximate only and may require adjustment to insure a minimum cumulative shaft socket length of ____feet into material classified as " _____ " on the test boring record sheet.

Rock layers less than ____feet in thickness shall not be included in the cumulative shaft socket length.

A minimum of ___feet of competent rock shall be provided below the bottom of the shaft tip. In order to confirm that competent rock is being provided below the bottom of the shaft, rock core sampling, as required under pay item 506D, shall be provided at each drilled shaft location for Bent No(s). _____. Core sampling shall extend a minimum of ____feet below the bottom of the shaft tip.

Bottom of shaft elevations shall not be altered without prior approval of the Bridge Engineer.

For condition "d" above, the following note should be provided regarding the shaft tip elevation:

Bottom of shaft elevations are approximate only and may require adjustment to insure a minimum __ foot socket into material classified as " _____ " on the test boring record sheet.

Material classified as "weathered _____" on the test boring record sheet shall not be considered in establishing the final shaft tip elevation. (Include this note as applicable)

Bottom of shaft elevations shall not be altered without prior approval of the Bridge Engineer.

Borings indicate that contractor should not encounter any material during drilling of the shaft that will require special drilled shaft excavation equipment (i.e., no pay item for 506-B required) and scour is a consideration of the design of the foundations.

For these conditions, the following note should be provided regarding the shaft tip elevation:

Bottom of shaft elevations shall not be altered without prior approval of the Bridge Engineer.

NOTE: Pay Item No. 506-B, Special Drilled Shaft Excavation, should always be set up as a pay item in the plans if:

1. Coring of material is indicated on the test-boring log.
2. Boulders are noted in the boring log.
3. Boring extends through material that has "N" values (SPT > 100 blows/foot)

GENERAL COMMENTS

_____ Verify that foundation details (bottom of footing, bottom of shaft, pile tip elevations) agree with recommendations provided in the foundation report or designer sketches.

_____ Verify that there will be no conflict in the proposed location of the new foundations verses the location of existing foundations. If a conflict does exist, then this will need to be addressed with a plan note instructing the contractor as to how the existing foundations are to be removed. Payment for this work should also be addressed if removal requirements differ than as described in the Standard Specifications. If available, include a copy of the original plans of the existing bridge to be removed.

_____ Crosshole Sonic Logging

_____ A pay item for Crosshole Sonic Logging should be provided for each diameter drilled shaft on the project. If the foundation report indicates that no water table was encountered during the drilling, then a quantity of 1 for each shaft diameter will suffice. If the foundation report indicates that the water table was encountered during drilling or if the shaft is to be constructed through water, then a quantity should be provided for each shaft.

_____ Piles (prestressed or steel)

_____ Verify that quantity for test pile(s) has been removed from estimated pile quantity in the Estimated Bridge Quantities total.

_____ Verify that pile size and design load shown on plans agree with designer sketches

_____ On Construction of new foundations, determine if any rip-rap or other material has been placed within limits of the proposed structure that may need to be removed by the contractor prior to construction of the new foundations. If so, then removal/possibly replacement, of this material will need to be addressed through notes on the bridge drawings. A method of payment for this work will also need to be addressed on the plans.

_____ Include old bridge plans of the existing bridge to be removed as a part of the contract drawings when these drawings are available. (Show as "E" sheets)

_____ Verify that drilled shaft excavation quantities (soil and rock excavation) have been calculated using hub elevations and rockline elevations (if applicable) based on the boring logs provided on the test boring record. The exception to this would be when bridge piers are to be constructed in roadway cut section and hub elevations represent ground elevation prior to roadway cut.

_____ Verify that area of unclassified excavation falling within the limits of the proposed bridge has been clearly indicated and noted for payment as a roadway item. (An example would be removal of old roadbed material adjacent to the proposed abutment, roadway cut, etc.)

_____ When mechanically stabilized earth wall abutments are required, insure that a pile / soil slip layer treatment has been called for so that pile down drag will be eliminated.

_____ Whenever a mechanical splice for reinforcement is required, insure that the following note is provided for the mechanical splice:

Furnished Mechanical splices shall be capable of developing 125% x yield strength of reinforcing bar. The sample submitted for testing shall be assembled in the same manner that will be used during field installation. There will be no direct payment for the mechanical splices. Cost for mechanical splices shall be considered a subsidiary obligation of Pay Item No. _____. See Special Provision for additional requirements.